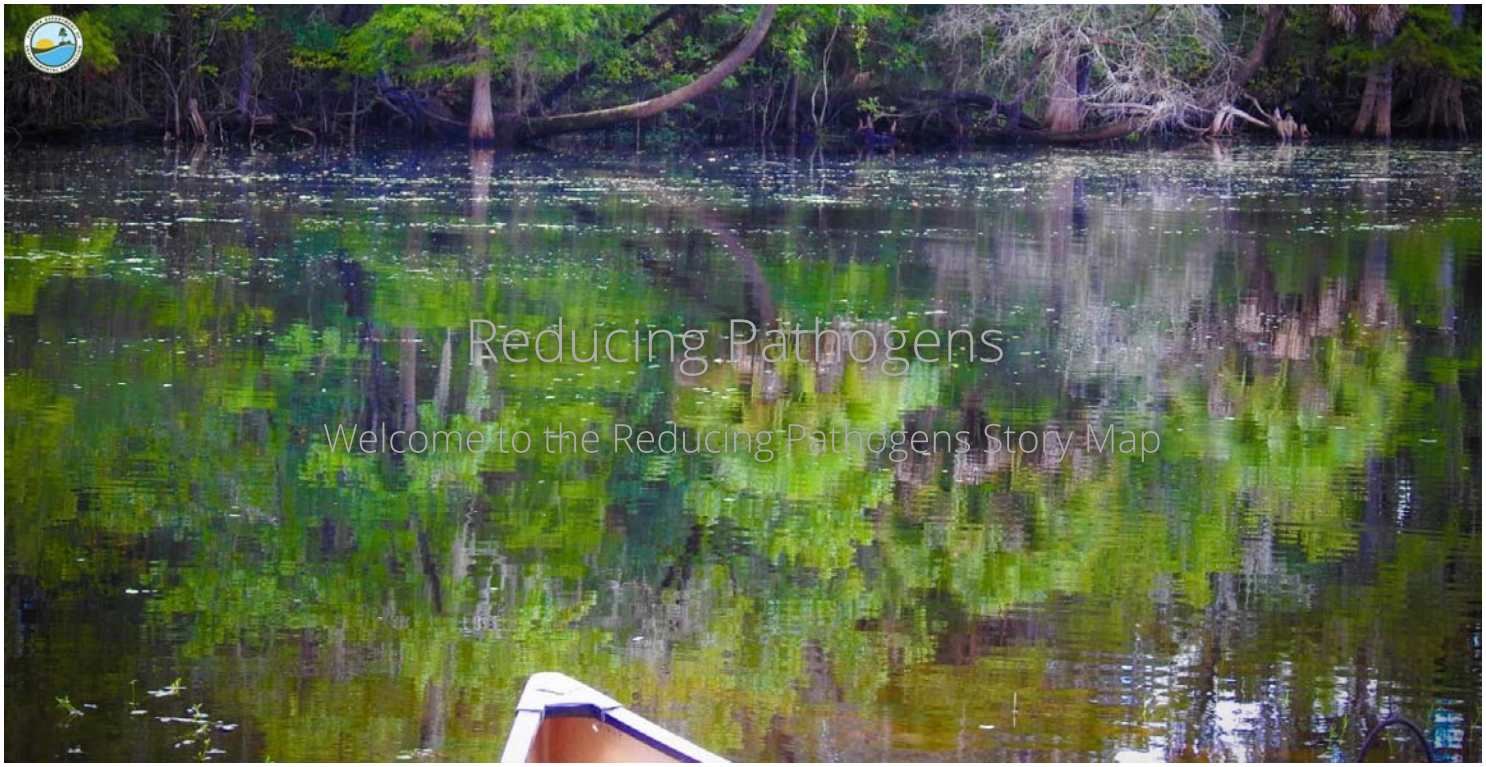


Introduction

A restoration plan by any other name, would smell as sweet. Whether we simply call it a restoration plan, a Basin Management Action Plan (adopted by Secretarial Order and enforceable), a Bacteria Pollution Control Plan (required by stormwater conveyance permits for municipal separate storm sewer systems), or Project Splash (we just made that one up), it's a "blueprint" to eliminate releases of pollutants, specifically pathogen laden waste, to waterbodies so they attain water quality standards and designated uses. It represents a holistic approach which starts with checking fecal indicator bacteria levels through water quality monitoring, assessing whether levels are meeting or exceeding the state criterion, cataloging potential sources in the watershed, implementing a comprehensive set of programs and strategies to address each source type, and source specific monitoring to inform stakeholders of the effectiveness of programs.

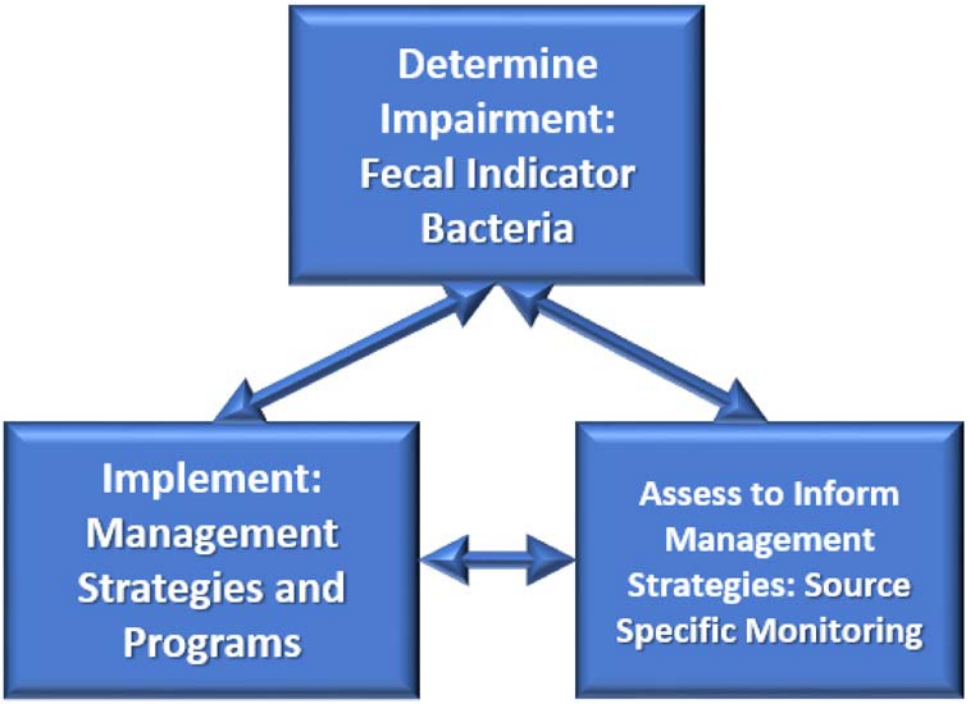


Image provided by PresenterMedia.com

Strategies in bacteria restoration plans include - stormwater treatment projects, sanitary sewer conveyance inspections and upgrades, septic system inspections, septic to sewer conversions, intensive source identification monitoring and investigations, agricultural best management practices, etc. - are all designated to ensure watersheds are managed properly while preserving the ability to enjoy waterbodies .

Restoration plans, in general, are broad based plans developed with local stakeholders. They rely on local input and local commitments.

Please use the tabs above to navigate through this Story Map and learn more about reducing pathogens and specific BMAPs and other restoration plans.

The intent of the bacteria criteria are to ensure swimmers and other recreational users can enjoy the resource with low risk of contracting illness (ex. hepatitis). The criteria were set based on EPA studies that associated swimmer illness rates to fecal indicator bacteria levels measured in the waterbody. Indicator bacteria, which indicate the presence of untreated fecal waste, were used rather than direct measurement of pathogens (ex. Salmonella, Giardia) because we cannot yet reliably or practically measure all of the potential pathogens. The state relied on fecal coliforms as the primary bacteria indicator for many years, but revised the criteria in 2016 to *Escherichia* coli *(E. coli*) in fresh waters and enterococci in marine waters, because there were stronger relationships between the new indicators and swimmer illness.

Risk image provided by PresenterMedia.com

A complicating factor with determining the appropriate response to indicator bacteria water qua are natural sources of indicator bacteria, such as wildlife. Natural sources generally have lower p illnesses. Fecal indicator bacteria measurements do not distinguish between high risk and low r making direct risk difficult to accurately assess. However, we know that the greater the indicator greater the potential risk of being exposed to pathogens while swimming.

Image provided by PresenterMedia.com

Use of indicator bacteria is like when someone is running a fever, you know that they are not well, but you do not the cause, so a visit to the doctor is warranted. Similarly, if bacteria levels are persistently above the criteria, furthe investigation to identify, locate, and eliminate the causes of anthropogenic sources is warranted. These investigat are resource intensive and are best coordinated as joint efforts across multiple jurisdictional and professional fiel work.

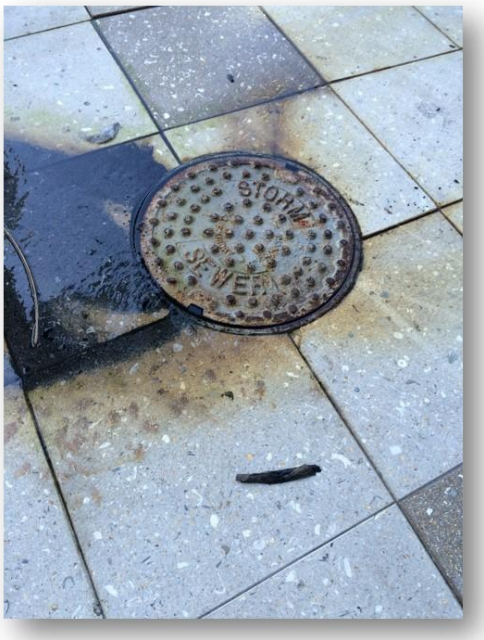
Image provided by PresenterMedia.com

Click here to learn more about pathogens in surface waters.

Actions to Stop Pathogens from Entering Our Waterbodies

Question Everything

The writing on the manhole cover indicated it contained stormwater but the odor and staining on the sidewalk indicated something much worse. Investigators found two illicit connections from toilets into the stormwater disposal system underground. The toilets were properly connected to sanitary sewer and the stormwater system was vacuumed and sanitized within about a week of the discovery.



Sidewalk stained by sewage discharge from stormwater system

Keep the Caps On to Prevent Sewer Spills

The white PVC pipe below is called a lateral. It conveys sewage from the building to the sanitary sewer conveyances owned by the utility, below ground. The opening on top is an access port to allow plumbers to dislodge blockages. Unfortunately, many property owners remove the clean out cap, as shown above, to drain their yard of flood waters during storms. The problem is that when stormwater enters the sanitary sewer conveyances it causes sewer spills by overloading the sewer system. It also overloads the sanitary sewer utility and reduces their ability to reduce nutrients and in some cases facilities must release improperly treated sewage to the environment. So, please, keep the caps on.

In these cases, code enforcement and the utility educated the property owners.

Clean out caps missing from sanitary sewer laterals

Grease Trap

Grease build-up clogs sanitary sewer conveyances and causes sanitary sewer overflows. So, it's important not to dump grease down the drain at home.

Grease traps are catchments between restaurants and sewer utility conveyances designed to keep grease from entering the utility-owned conveyances and must be pumped out during regular maintenance.

Field staff saw this greasy film on the asphalt and on top of the grease trap cover and suspected it was overflowing. Instead, they determined it had been recently pumped out but a spill occurred after pumping. Restaurants keep the pump out receipts. So, authorities contacted the pump out company to ensure this spill was cleaned up and further spills are prevented.

Greasy sludge on asphalt and grease trap cover

Programs to reduce sanitary sewer overflows (sewage spills) include sanitary sewer conveyance inspection programs, inflow and infiltration reduction programs, and conveyance system renovations, or responsive site specific investigations triggered by persistent high bacteria levels.

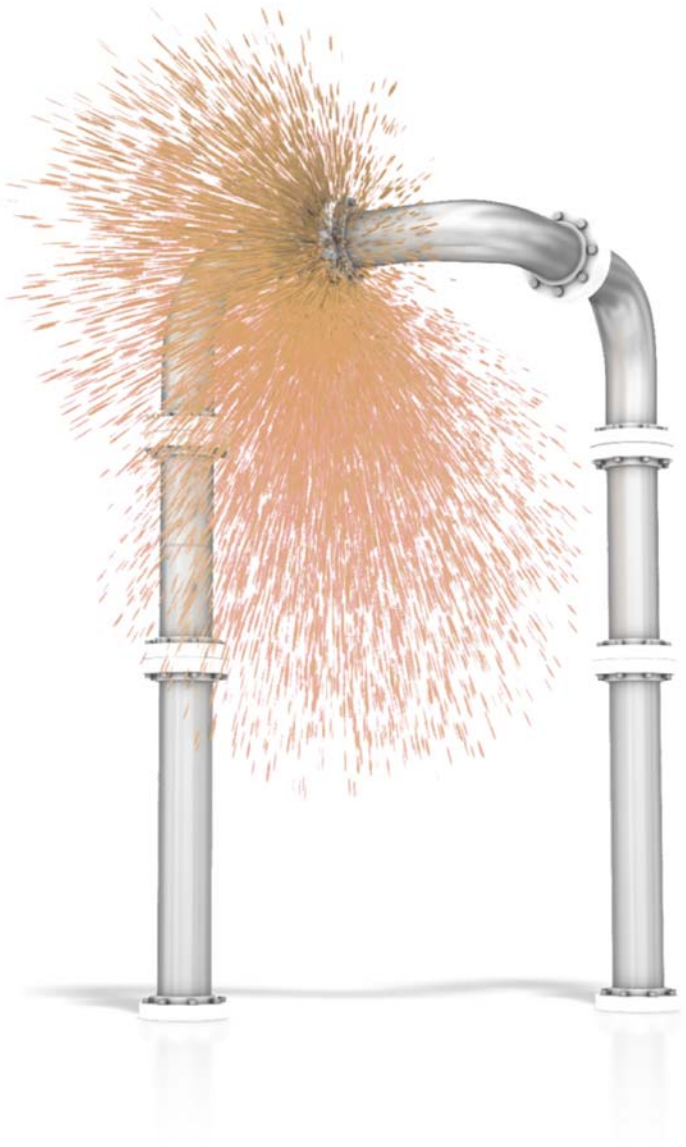


Image provided by PresenterMedia.com

Illicit Discharges

The white PVC pipes in these images are considered illicit discharges because they convey sewage to the environment. In these cases, either the sanitary sewer utility or DOH, worked with code enforcement and required property owners to properly hook into the sanitary sewer conveyances or an onsite septic treatment and disposal system (septic system).

Illicit discharge pipes

Programs to address pathogens from onsite sewage treatment and disposal systems (septic systems) include septic to sewer conversion where flooding or aging systems cause failure and responsive site-specific investigations triggered by high-persistent ambient water quality results.

Image provided by PresenterMedia.com

Degrading sanitary sewer manhole

These programs can occur at a variety of scales including county-wide, city-wide, and utility-wide. Additionally, some areas may be covered by multiple programs or ordinances. Each program is evaluated and adjusted to meet the needs of the system. Part of the evaluation of these approaches includes monitoring for source specific indicators of untreated human sewage in each contributing waterbody and if they are present, water quality experts continue to sample and follow the signal upstream in an effort to locate their origin. Source types are catalogued and programs and schedules are adjusted to quickly address areas with failing infrastructure or other causes.

Trash in Storm Drains are Bacteria Havens

Stormwater system in need of clean out and maintenance

Urban stormwater projects include constructed best management practices (BMPs) to catch stormwater and pollutants and allow for treatment before release to the environment when properly maintained. Constructed BMPs include stormwater ponds and swales.

Some BMPs reduce the amount of pollutants reaching stormwater like street sweeping, flood controls, system wide illicit discharge detection and elimination inspection programs, responsive site specific investigations triggered by high bacteria levels in sampling results or citizen complaints, local pet waste ordinances, dog waste stations, and public education to reduce personal pollution.

Solutions to Boater Waste

Sailboats on Bayou Chico

Programs to address boater waste discharges include easy access to pump-out stations throughout the watershed, public education, and FWC onboard inspections to ensure all boats with permanently installed toilets are attached to a United States Coast Guard certified marine sanitation device that stores human waste for disposal at a pump out facility rather than directly discharged to Waters of the State.

Dumpster Maintenance

Dumpsters should be in good condition and shouldn't leak. Lids should remain shut to prevent collection of rain water. When dumpsters with rainwater are dumped they often spill, carrying bacteria and trash to storm drains. Lastly, drain ports located at the bottom of a dumpster should be plugged at all times. If there is staining on the ground near a dumpster, better maintenance is probably needed. In these cases, code enforcement spoke with business owners to ensure they understood why its important and how to better maintain their dumpsters.

Left image: Dumpster lid open, trash on ground, staining on asphalt. Right image: Dumpster drain without plug.

What About Livestock?

All agricultural nonpoint sources in the BMAP area are statutorily required either to implement appropriate BMPs or to conduct water quality monitoring that demonstrates compliance with state water quality standards. FDACS' Office of Agricultural Water Policy (OAWP), Florida Forest Service, and Division of Aquaculture develop and adopt BMPs in coordination with DEP, UF-IFAS, and applicable producer groups. Producers that choose to implement BMPs must file a signed Notice of Intent (NOI) and BMP checklist with FDACS and implement the applicable BMPs.

What are High Risk Sources of Pathogens?

Untreated human waste:

- Failing sanitary sewer conveyances (utility owned and privately owned)
- Failing septic systems
- Illicit connections from building to stormwater collection systems
- Stormwater runoff
- Boater waste discharges

Livestock Waste

Other Contributors of Low Risk Anthropogenic Sources of Indicator Bacteria

Pet waste

Dumpster drainage

Artificially inflated populations of wildlife (hobby feeding or dumpster divers):

- Racoons
- Feral Cats
- Muscovy Ducks
- Seagulls

Grass clippings

Each of the low risk anthropogenic sources identified above are usually addressed through local ordinances.

Are There Natural Sources of Indicator Bacteria?

Bird Rookeries

Manatees

Environmental *E. coli* naturally growing in sediment

Note, natural sources of indicator bacteria should not be tampered with for the purpose of meeting state standards; they are not high risk to human health.

Progress

This story was made with Esri's Story Map Journal.
Read the interactive version on the web at http://arcg.is/eSiO8.

Image provided by PresenterMedia.com

Information on progress in the Fecal Indicator BMAPs can be found in the latest Statewide Annual Report.

PROGRESS

Holistically, the idea of “assessing progress” touches on a few concepts.

Fecal Indicator Bacteria

Fecal indicator bacteria levels are useful as an indicator of potential problems that need further investigation. The most common measure of progress is through comparison of fecal indicator bacterial levels to criteria in the state standard. This is how the state assesses the health of waterbodies to determine if they are impaired.

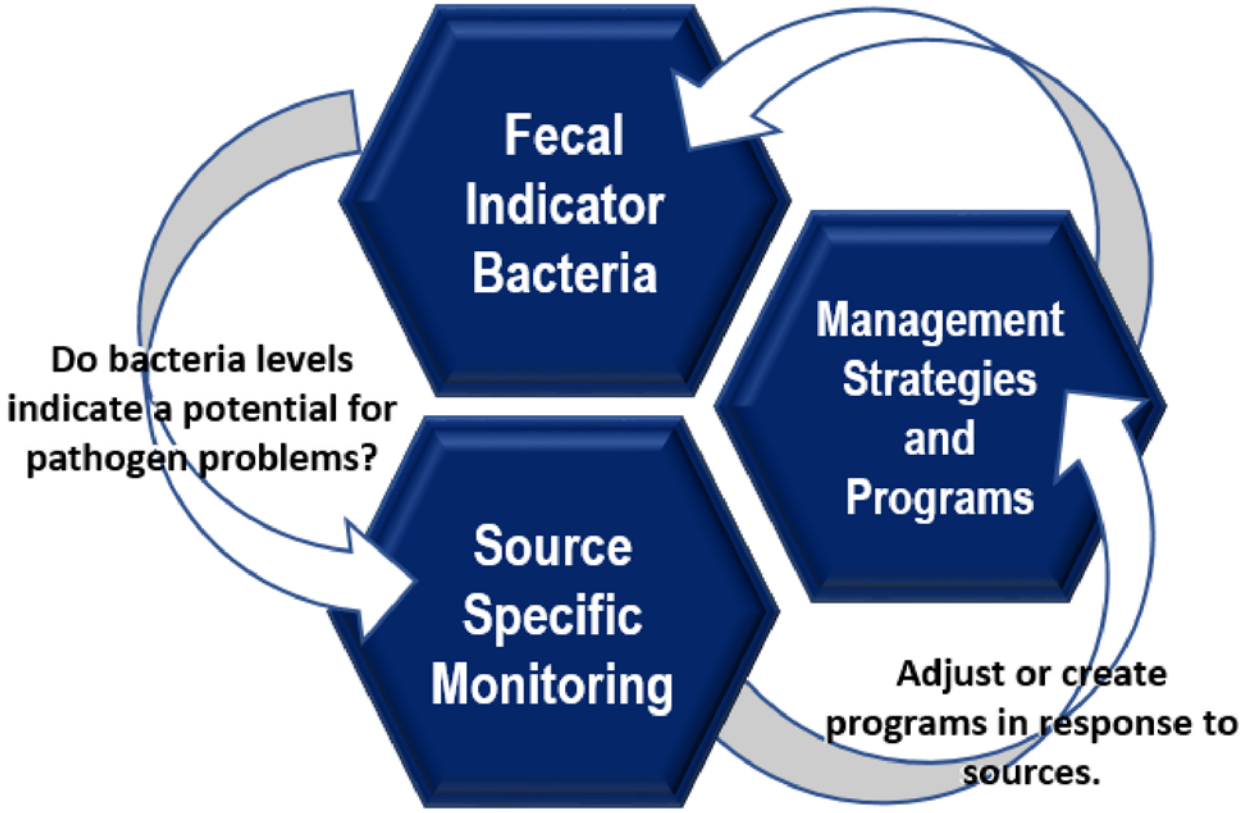
Management Strategies and Programs

Whether or not a waterbody is impaired for bacteria, certain watershed management strategies are necessary to prevent pathogens from entering recreational waters. An inventory of potential sources as compared to the management strategies to address each is evaluated and additional strategies are developed where deficiencies are noted.

Source Specific Monitoring

We then use source specific monitoring to assess whether the existing strategies to address potential sources, especially untreated human waste, reflect adequate watershed management and sustainable use of the waterbody.

Source specific monitoring is water quality testing for parameters that are only found in the waste of humans or other animals. If source testing results indicate untreated human waste is present, watershed managers know whether existing approaches need to be reevaluated, reprioritized, schedules need to be advanced, or new management strategies must be developed. A challenge with this type of assessment, such as, following a single trail of sewage to its origin, above or below ground, is very complicated, time consuming, and expensive.



Source ID Cycle of checks and balances.png

Water Quality Sampling to Find Sources

Sampling in a stormwater manhole using a pole with the sample bottle attached to the end.

Sampling a ditch using a pole with the sample bottle attached to the end.

Sampling through a storm grate using a peristaltic pump.

Missing Sewer Pipe

Case of the Missing Sewer Pipe

1. Water quality lab results indicated raw sewage in the waterbody. Acetaminophen was present along with elevated enterococci (indicator bacteria), so staff returned to the sampling site and performed field investigations while they collected more water quality samples to pin point the origin of the raw sewage.

Image provided by PresenterMedia.com

2. They followed mild suds and light bacterial film on submerged vegetation about 700 meters upstream of the original site.

3. They noticed tracks from land moving equipment in the back yard where recent landscaping had been performed.

4. The sewer utility further investigated the site and found the clay sewer pipe, which runs underground and

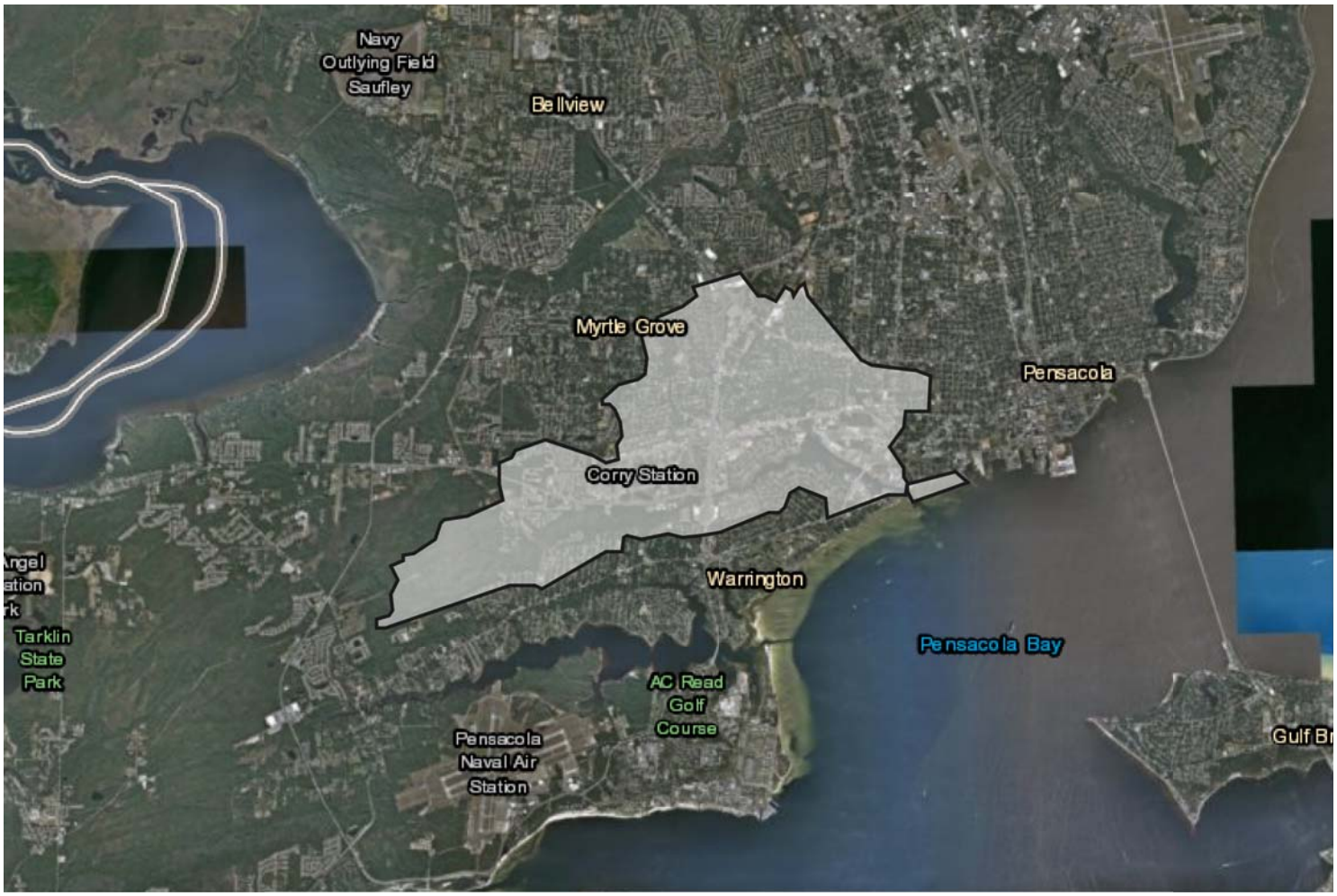
4. The sewer utility further investigated the site and found the clay sewer pipe, which runs underground and adjacent to the creek, had been broken and partially removed.

5. So, they replaced a 40’ stretch of pipe with PVC pipe and stopped the sewer leak.

Image provided by PresenterMedia.com

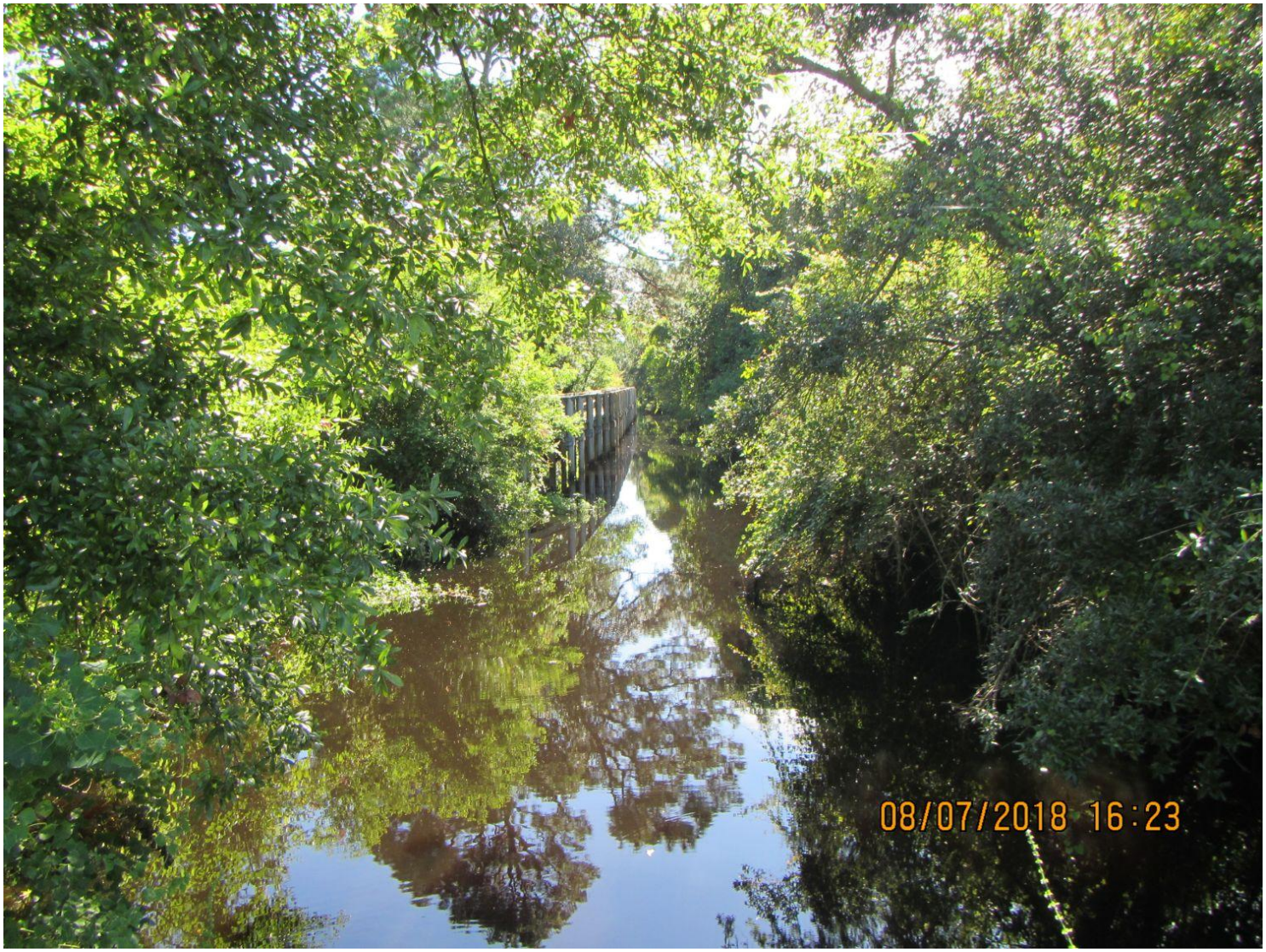
Bayou Chico BMAP

This story was made with Esri's Story Map Journal.
Read the interactive version on the web at http://arcg.is/1WDGem.



OVERVIEW

The Bayou Chico Basin Management Action Plan (BMAP) was adopted in August 2011 to implement the fecal coliform Total Maximum Daily Load. The BMAP includes management strategies or projects, to be implemented by local stakeholders, that aim to eliminate and prevent the release of waste, containing pathogens, to natural waterbodies. Class III waterbodies have a designated use of recreation, propagation, and the maintenance of a healthy, well-balanced population of fish and wildlife. The purpose of the BMAP is to restore the waterbody, protect human health, and sustain safe recreational uses for future generations.



Jones Creek

Basin Management Action Plan (BMAP)

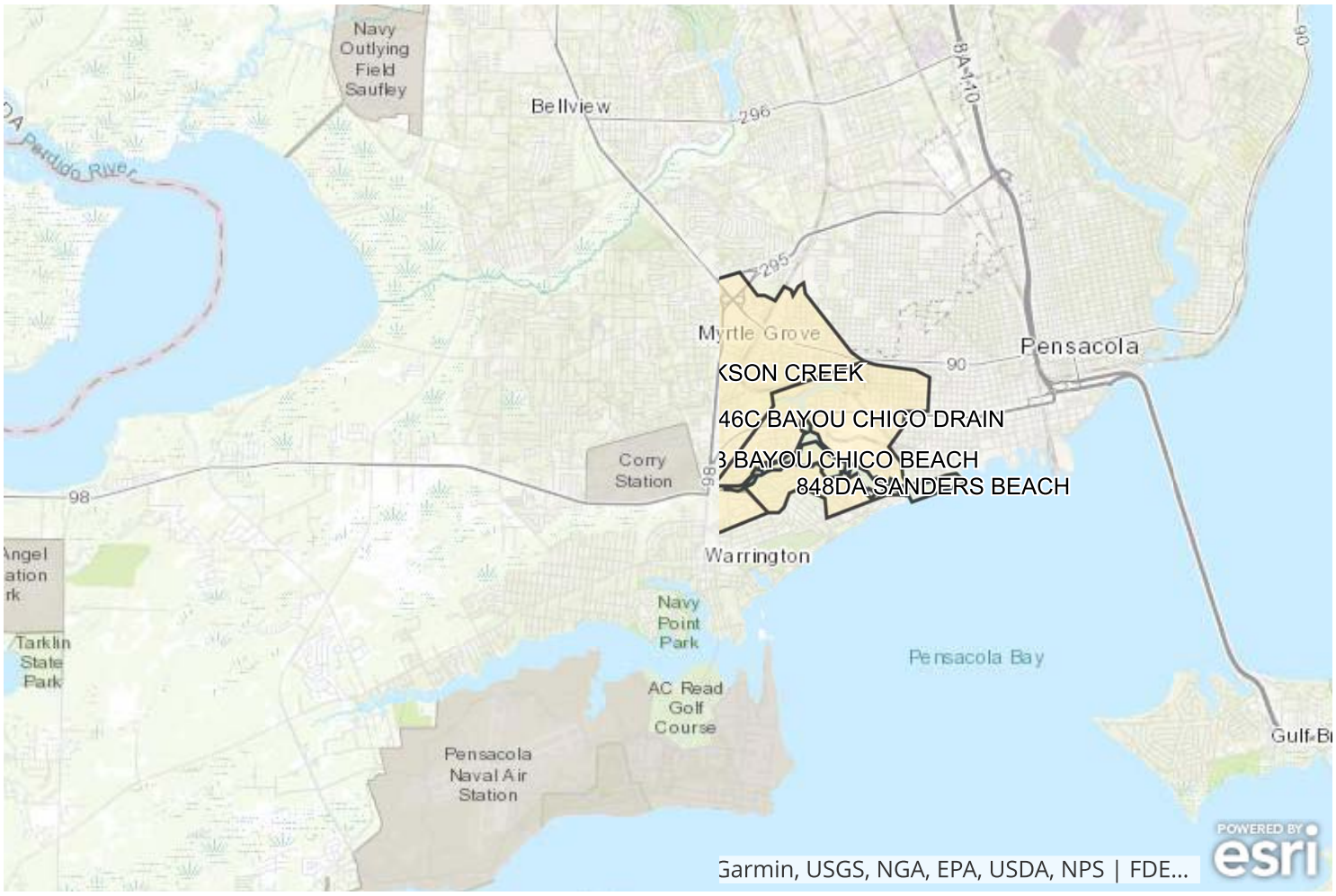
Basin Management Action Plan (BMAP) adopted: August 2011

BMAP Restoration Area: 6,906 acres

Total Maximum Daily Load (TMDL)

Total Maximum Daily Load (TMDL) Restoration Targets adopted: February 2008

Location



The Bayou Chico watershed, which discharges to Pensacola Bay, is located in the southern end of Escambia County, just east of Blue Angel Parkway and north of Bayou Grande, and has a 10.36-square-mile drainage area and a water surface area of approximately 0.39 square miles.

Tricolored Heron on Bayou Chico

The waterbodies addressed by this Basin Management Action Plan (BMAP) consist of two Class III fresh waterbodies (Jones Creek and Jackson Creek) and four Class III marine waterbodies (Bayou Chico, Bayou Chico Drain, Bayou Chico Beach (at Lakewood Park), and Sanders Beach).

Contacts

Report a Problem

Environmental restoration is everyone's business. We need your help. If you see (and smell) something resembling sewage on the ground or discharging from a pipe to the environment, please report the time, date, location, and describe your observation so local environmental response teams can check it out. If it's a problem, they will ensure it is fixed or eliminated. Thank you, from all of us working to keep our waterbodies safe for recreation!

Man by Jackson Creek

Escambia County Environmental Emergency Line.....(850) 595-3440
City of Pensacola 311 Citizens Help 311
ECUA (sanitary sewer utility).....
.....http://www.ecua.fl.gov/mobile/report-a-problem .....(850) 476.0480
DOH - Escambia County.....(850) 595-6700 ex. 2000
DBPR Division of Hotels and Restaurants.....(850) 236-2203
State Wide EMERGENCIES ONLY.....1 (800) 320-0519
State Wide Non-emergencies.....(850) 413-9900
FWCC: 24 Hour Hotline.....1 (888) 404-FWCC (3922)

For more information on the Bayou Chico BMAP, please contact:

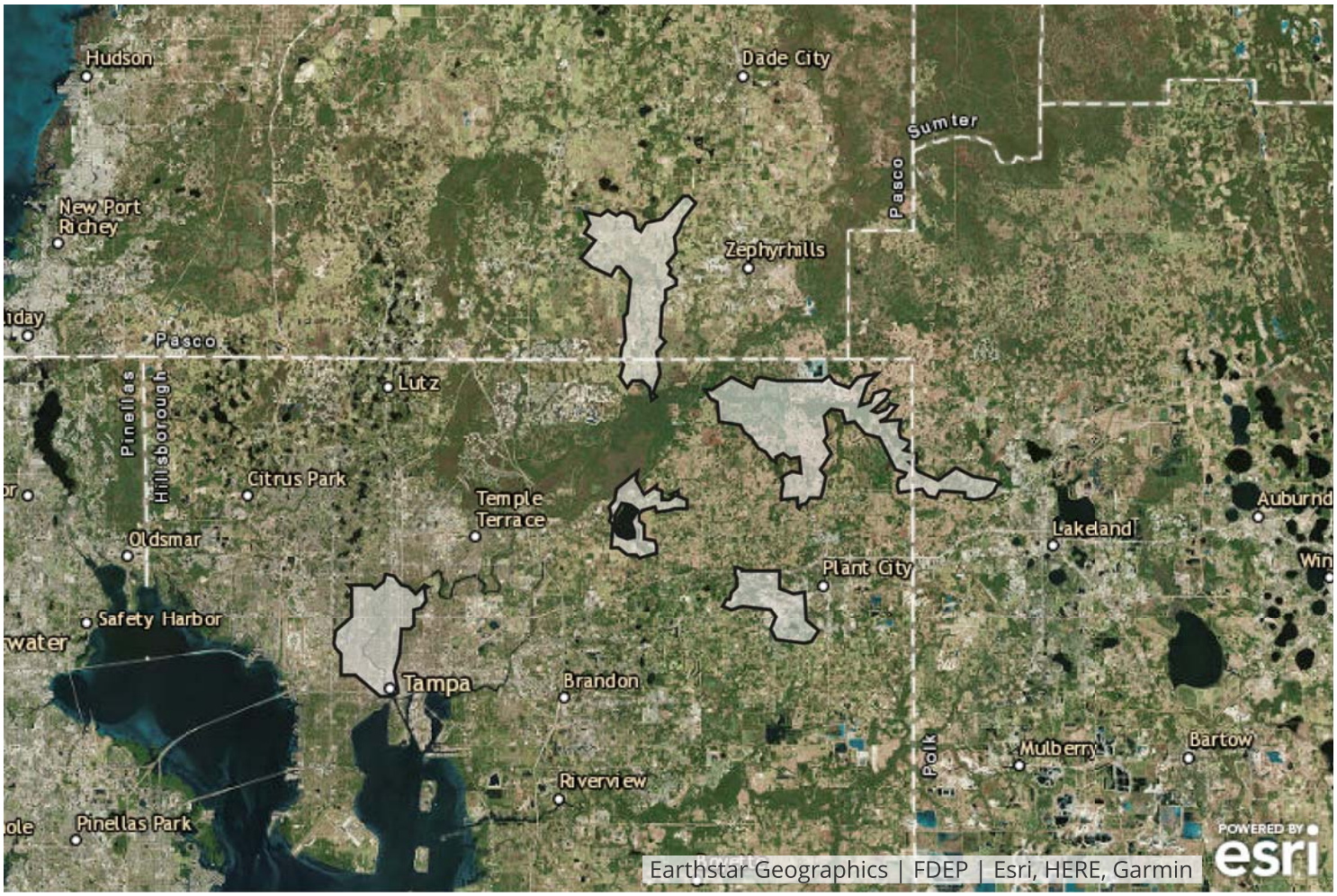
Anita Nash
Voice: (850) 245-8545
email Anita.Nash@dep.state.fl.us

For more information on the Division of Environmental Assessment and Restoration's BMAP program, click here.

Marina on Bayou Chico

Hillsborough River BMAP

This story was made with Esri's Story Map Journal.
Read the interactive version on the web at http://arcg.is/0THHyC.



OVERVIEW

The Hillsborough River Basin Management Action Plan (BMAP) was adopted in June 2009 to implement the fecal coliform Total Maximum Daily Load. The BMAP includes management strategies or projects, to be implemented by local stakeholders, that aim to eliminate and prevent the release of waste, containing pathogens, to natural waterbodies. Class III waterbodies have a designated use of recreation, propagation, and the maintenance of a healthy, well-balanced population of fish and wildlife. The purpose of the BMAP is to restore the waterbody, protect human health, and sustain safe recreational uses for future generations.

Basin Management Action Plan

Basin Management Action Plan (BMAP) adopted: June 2009

BMAP Restoration Areas: 50,743 acres

Total Maximum Daily Loads (TMDLs)

Restoration Targets adopted: September 2004

Lower Hillsborough River TMDL (WBID 1443E)

Spartman Branch TMDL (WBID 1561)

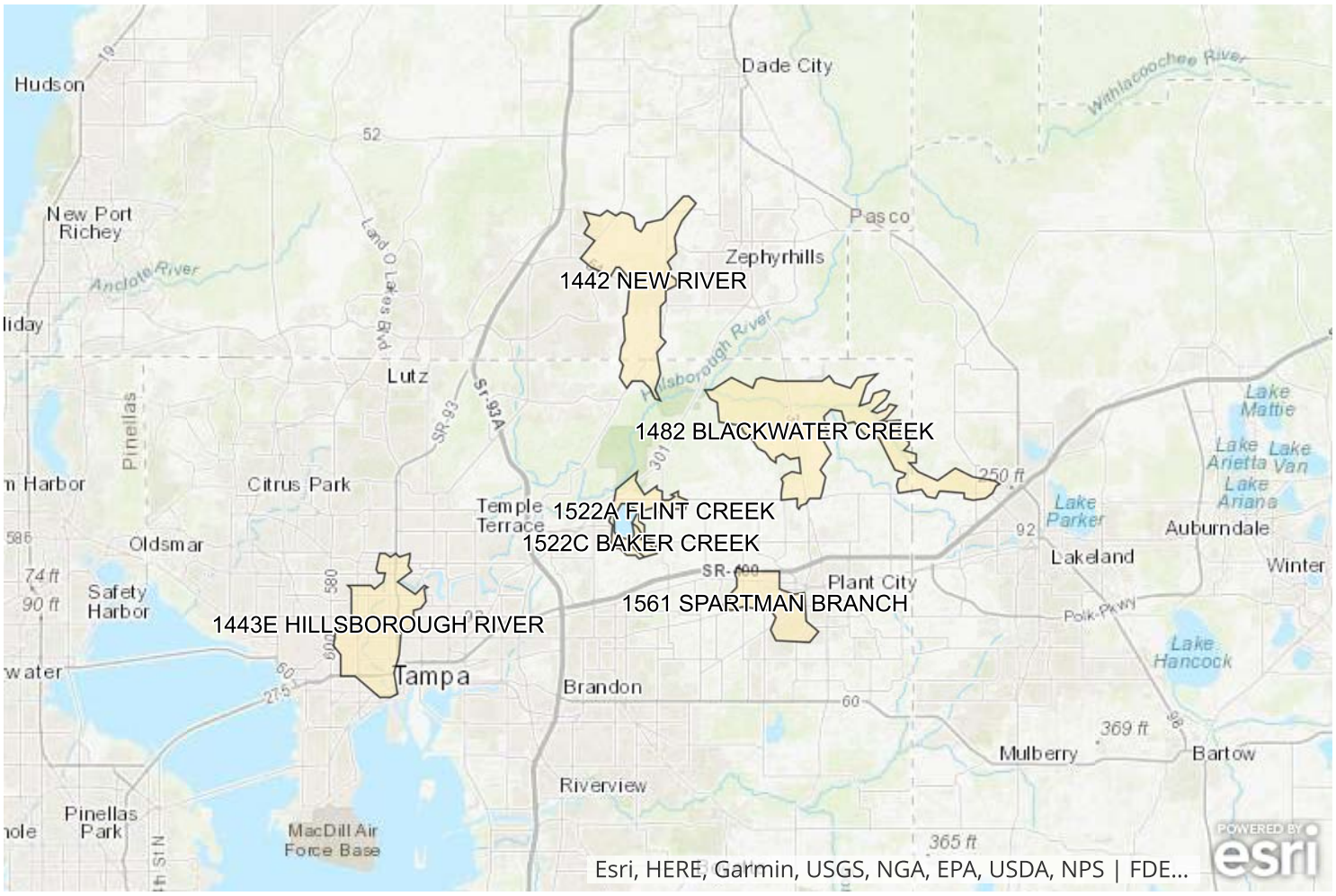
Blackwater Creek TMDL (WBID 1482)

New River TMDL (WBID 1442)

Baker Creek TMDL (WBID 1552C)

Flint Creek TMDL (WBID 1522A)

Location



The waterbodies addressed by this Basin Management Action Plan (BMAP) consist of the following Class III fresh waterbodies, tributaries to Hillsborough River, and the Lower Hillsborough River, a Class III marine waterbody.

Blackwater Creek, WBID 1482, located in northern Hillsborough County, is 13.6 miles long and has a 113-square-mile watershed. It drains to the Hillsborough River.

New River, WBID 1442. Located in southeastern Pasco County and northern Hillsborough County, the New River is 11.1 miles long, has a 20.9-square-mile watershed, and drains to the Hillsborough River.

Spartman Branch, WBID 1561, which is 4.5 miles long, is located in north-central Hillsborough County and the City of Plant City. It has a 27.4-square-mile watershed and drains to Pemberton Creek, which discharges to Baker Creek and Lake Thonotosassa.

Baker Creek, WBID 1522C, has a 27.4-square-mile watershed located in north-central Hillsborough County. The creek is 2 miles long and drains to Lake Thonotosassa, which discharges to the Hillsborough River through Flint Creek.

Flint Creek, WBID 1522A, which is 2.3 miles long, is located in north-central Hillsborough County and discharges from Lake Thonotosassa to the Hillsborough River. Its watershed encompasses more than 60 square miles and

includes the Spartman Branch and Baker Creek WBIDs as sub-basins.

The Lower Hillsborough River, WBID 1443E is located in the City of Tampa, between Sulphur Springs and the river mouth at upper Hillsborough Bay. The distance from Sulphur Springs to the river mouth is 7.8 miles. This 675-square-mile watershed includes all of the WBIDs listed above.

Contacts

Report a Problem

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County:

Hillsborough County Environmental Emergency Line.....(813) 627-2600
Polk County.....(863) 534-7377
Pasco County.....(727) 834-3611

City:

City of Plant City ... .(813) 659-4200 Ext. 4150
https://www.plantcitygov.com/requesttracker.aspx
City of Tampa Code Enforcement .....(813) 274-3101
City of Tampa (24 hour) sanitary sewer emergency..... ..(813) 247-3451

DOH:

DOH - Hillsborough County.....(813) 307-8015 Ext. 5901
DOH - Pasco County .....(727) 861-5661 Ext. 3282
DOH - Polk County .....(863) 578-2059

DBPR:

Division of Hotels and Restaurants.....(813) 233-4590

DEP:

State Wide EMERGENCIES ONLY:.....1 (800) 320-0519
State Wide Non-emergencies .....(850) 413-9900

FWCC

24 Hour Hotline.....1 (888)-404-FWCC (3922)

For more information on the Hillsborough River BMAP, please contact:

Anita Nash
Voice: (850) 245-8545
email Anita.Nash@dep.state.fl.us

For more information on the Division of Environmental Assessment and Restoration's BMAP program, click here.

Opposite Image: Joseph Gruber CC BY-NC-ND 2.0

Lower St. Johns Tributaries BMAP

This story was made with Esri's Story Map Journal.
Read the interactive version on the web at http://arcg.is/11zKiz.

Overview

The Lower St. Johns River (LSJR) Tributaries Basin Management Action Plans (BMAP) were adopted in December 2009 and August 2010 to implement the fecal coliform Total Maximum Daily Load. The BMAP includes management strategies or projects, to be implemented by local stakeholders, that aim to eliminate and prevent the release of waste, containing pathogens, to natural waterbodies. Class III waterbodies have a designated use of recreation, propagation, and the maintenance of a healthy, well-balanced population of fish and wildlife. The purpose of the BMAP is to restore the waterbody, protect human health, and sustain safe recreational uses for future generations.

Trout River, David Ellis CC BY-NC-ND 2.0

Basin Management Action Plans (BMAPs)

Lower St. Johns River Basin Tributaries BMAP adopted: December 2009

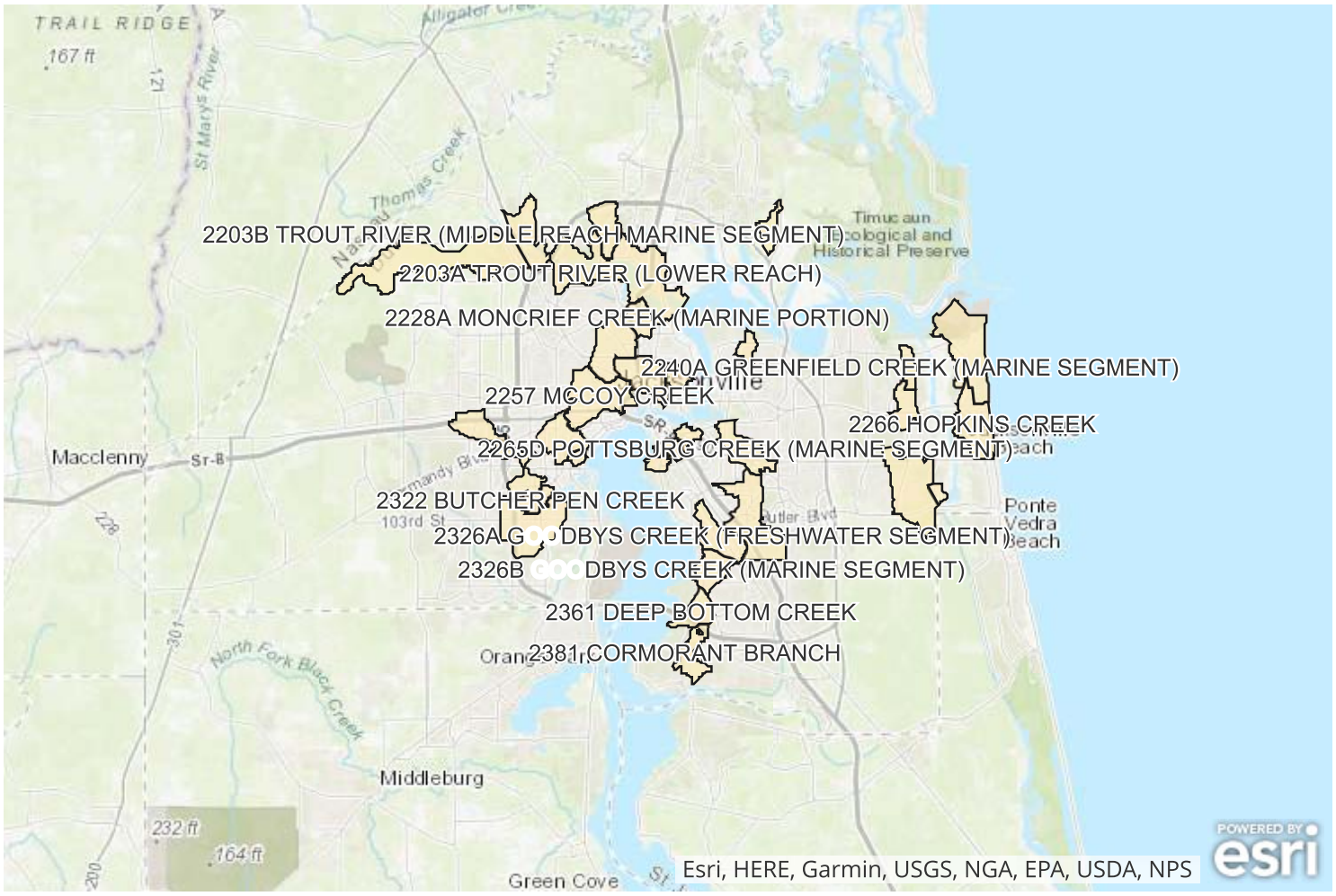
Lower St. Johns River Basin Tributaries BMAP adopted: August 2010

BMAPs Restoration Areas: 67,468 acres

Total Maximum Daily Load (TMDLs)

Total Maximum Daily Load (TMDL) Restoration Targets adopted: 2006, 2009, and 2010

Location



The Trout River, Ortega River, North Mainstem, and Intracoastal Waterway are the receiving waters of the Lower St. Johns Tributaries. At least part of the drainage to the tributaries flows through urban Jacksonville and many are tidally influenced for substantial distances.

Pottsburg Creek, DonBarrett CC BY-NC-ND 2.0.

The 10 tributaries discussed in the first LSJR Tributaries BMAP occupy approximately 6% or more than 166 square miles of the Lower St. Johns River (LSJR) Basin.

Big Fishweir Creek
Butcher Pen Creek
Deer Creek
Goodbys Creek
Hogan Creek
Miller Creek
Miramar Creek
Newcastle Creek
Open Creek
Terrapin Creek

The 15 tributaries discussed in the LSJR Tributaries BMAP II occupy approximately 3%, or 78 square miles, of the Lower St. Johns River (LSJR) Basin.

Cormorant Branch
Craig Creek
Blockhouse Creek
Deep Bottom Creek
Fishing Creek
Greenfield Creek
Hopkins Creek
Lower Trout River
McCoy Creek
Moncrief Creek

Pottsburg Creek
Sherman Creek
Upper Trout River
Williamson Creek
Wills Branch

Contacts

Report a Problem

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City:

City of Jacksonville ....(904) 630-2489
City of Atlantic Beach .....(904) 247-5855
City of Neptune Beach.....(904) 270-2400 Ext. 31
City of Jacksonville Beach..... .(904) 247-6219

DOH:

DOH - Duval County .... (904) 253-2422

DBPR

Division of Hotels and Restaurants.....(904) 723-5864

DEP:

State Wide EMERGENCIES ONLY.....1 (800) 320-0519
State Wide Non-emergencies .....(850) 413-9900

FWCC

24 Hour Hotline.....888-404-FWCC (3922)

For more information on the Lower St. Johns River Tributaries BMAPs, please contact:

Anita Nash
Voice: 850-245-8545
email Anita.Nash@dep.state.fl.us

For more information on the Division of Environmental Assessment and Restoration's BMAP program, click here.

Image Opposite: Trout River, David Ellis CC BY-NC-ND 2.0